University of Lisbon

Faculty of Pharmacy

Mapping Clinical Pharmacy Education in Europe

Laura Alexandra Moura Gomes

Master of Science in Pharmaceutical Sciences

2019

University of Lisbon

Faculty of Pharmacy

Mapping Clinical Pharmacy Education in Europe

Laura Alexandra Moura Gomes

Fieldwork of the Master of Science in Pharmaceutical Sciences
Presented to University of Lisbon through Faculty of Pharmacy

Supervisor: Professor Filipa Alves da Costa, PhD,
Invited Professor at University of Lisbon

Co-Supervisor: Professor Stephane Steurbaut, PhD,
Associated Professor at Vrije Universiteit Brussel

2019

Abstract

Background and objective: Clinical pharmacy is undoubtedly an area within pharmacy that should be fostered to improve patient care. However, there is currently no general overview about clinical pharmacy education in Europe. This study was set up with the aim to characterise the education and practice of clinical pharmacy in Europe.

Setting and Method: Cross-sectional study conducted in 2018 using a survey developed by the Educational Committee of the European Society of Clinical Pharmacy. The survey comprised three sections characterising pre-graduated education, post-graduate education and professional practice. We aimed to receive responses from 44 European countries/regions. A preliminary report was developed with data from 36 regions. The aforementioned report was sent to all respondents and posted in ESCP Website for proper validation of the information. After collecting the validated reports, data were analysed.

Results: Data shows that 95% of European countries have under-graduate education covering clinical pharmacy topics. Around 73% of the European countries have PhD programmes and 62% have available Masters and/or Diploma degrees in Clinical Pharmacy. From the countries that have specialisation in clinical pharmacy, 65% of them include some job specifications and professional rights such as comprehensive medication review, consultation for therapy in pregnancy and independent prescribing by pharmacists. A comparison by assessing the number of discrepancies and answers with missing data, shows that, from the preliminary report to 1st validated preliminary report, there was a 20% and 30% reduction in the number of discrepancies and missing data, respectively.

Conclusion: The clinical pharmacy education and practice varies widely around Europe, with some countries having a strong implementation of the pharmacist as a clinical healthcare professional and other countries taking short steps in the implementation of clinical pharmacy. The data are promising but need further validation from all countries.

Key-words: Clinical, Pharmacy, Education, Practice, Europe.

Resumo

Contextualização e objetivos: A Farmácia clínica é uma área central das ciências farmacêuticas, permitindo que os farmacêuticos realizem tarefas especializadas na otimização da segurança e eficácia dos medicamentos. Contudo, não existe até à data uma visão geral sobre a educação e prática em farmácia clínica na Europa. Posto isto, este estudo foi realizado com o objetivo de efetuar uma análise crítica à educação e prática em farmácia clínica na Europa.

Método: Um *Cross sectional study* foi realizado em 2018, através de um questionário desenvolvido pelo Comité Educacional da Sociedade Europeia de Farmácia Clínica. O questionário incluiu três secções que caracterizam a educação pré e pós graduada, bem como a prática profissional. O nosso objetivo seria receber respostas de 44 países/regiões. Após a recolha dos dados, foi desenvolvido um relatório preliminar com os dados recebidos. O relatório mencionado foi enviado a todos os respondentes e publicado no site da Sociedade Europeia de Farmácia Clinica para validação das informações. Após recolha dos documentos validados, os dados foram analisados.

Resultados: Os dados mostram que 95% dos países europeus possuem educação pré-graduada cobrindo tópicos em farmácia clínica. Cerca de 73% dos países europeus possuem Doutoramentos em Farmácia Clínica e 62% possuem Mestrados na área. Metade dos países reconhece a farmácia clínica como uma área de especialização. Dos países que possuem especialização, 65% incluem algumas especificações e direitos profissionais, nomeadamente, revisão terapêutica, consultas durante a gravidez e prescrição independente por farmacêuticos. Avaliando os dados preliminares com os dados após a primeira validação, o número de discrepâncias diminuiu 20% e o número de informações em falta diminuiu 30%.

Conclusão: A educação e a prática em farmácia clínica variam amplamente em toda a Europa, com alguns países mostrando uma forte implementação do farmacêutico enquanto clínico e outros países revelando os primeiros passos na implementação da farmácia clínica. Os dados são promissores mas necessitam de validação adicional de todos os países.

Palavras-chave: Clínica, Farmácia, Educação, Prática, Europa.

Acknowledgements

O meu maior agradecimento é direcionado à Professora Filipa Alves da Costa, que, sempre incansável, disponibilizou o seu tempo para me ajudar em todo o processo de desenvolver este trabalho de campo. Considero-a um enorme exemplo de dedicação e trabalho, exemplo este, que certamente me acompanhará durante toda a vida.

O meu segundo agradecimento é direcionado ao Professor Stephane Steurbaut, que, mesmo à distância, sempre esteve disponível para ajudar em qualquer que fosse o assunto. Agradeço a sua amabilidade e atenção que sempre teve comigo.

Para a minha mãe, sempre atenciosa e assertiva. Obrigada por seres a minha companheira de todas as horas e por me mostrares que a vida é uma jornada difícil mas que todos os dias são dias felizes, independentemente daquilo que nos é reservado. Para o meu irmão, que mesmo longe, está sempre perto e me mostra que nunca devemos desistir dos nossos sonhos e que as coisas são sempre mais simples do que parecem. Para a minha família, pelo apoio incondicional que sempre mostram.

Para os meus amigos do coração, por durante estes anos, me mostrarem sempre que, sozinhos vamos mais rápido, mas juntos vamos mais longe. Agradeço todo o carinho, apoio e confiança que sempre depositaram em mim.

Para as minhas maiores companheiras de tese, Matilde e Maggy, muito obrigada por todo o apoio e carinho durante todo este processo, sem vocês, teria sido muito mais difícil.

Finalmente, agradeço a todas as pessoas que, de uma forma ou outra, cruzaram o meu caminho, pois acredito que também elas tiveram um papel fulcral para o meu desenvolvimento pessoal e profissional.

Table of contents

Table of figures

Table of tables

1. Introduction

It is well known that the pharmaceutical profession has undergone a huge evolution in the last decades. For many years, pharmacists only produced and dispensed medicines without any significant clinical intervention on the patient outcomes. With the industrial revolution, the function of drug preparation was almost totally taken over by pharmaceutical manufacturers, despite that, pharmacy schools continued to teach basic physical and pharmaceutical sciences. Taking into consideration that pharmacists are highly qualified health professionals, was realized that their capabilities were being undervalued and, therefore, this paradigm has been significantly changing towards a more active role in patient's life and medication management, while preserving traditional pharmacist roles. The beginning of Clinical Pharmacy in pharmacy schools was originated in the 1960's by a group of students at College of Pharmacy of the University of Michigan. One of the students after becoming graduated, decided to implement Clinical pharmacy as a discipline in the University of Kentucky. Following Kentucky's lead, many faculties all over the US started to develop clinical education in pharmacy schools. From a product-oriented to a patient-oriented approach, the Clinical Pharmacist then emerged, to make a vital contribution to patient care by managing drug therapy. (1)(2)(3)

The average life expectancy of the world's population is increasing and it is therefore estimated that in the future polypharmacy will increase further. Polypharmacy increases the probability of medication errors, drug interactions, drug-related problems, as well as adverse reactions. (4) In 2018, 14 592 054 suspected adverse drug reactions were reported by EudraVigilance. This system manages and analyses information on suspected adverse drug reactions following market approval within the European Economic Area. (5) On the other hand, health innovation has increased drastically with the consequent introduction of new medicines at the same pace, which leads to new challenges in quality control and in the responsible use of medicines. Thus, there is an open door for pharmacist's intervention in medical teams at a hospital and acute care settings, as well as community pharmacies through regular follow-up after primary care interventions. (1)

Using a patient-centred approach, the clinical pharmacist provides specific recommendations on medicines use and helps medical staff make therapeutic decisions. Additionally, clinical pharmacists perform pharmacokinetics monitoring as well as, medicines-related outcomes monitoring. Clinical Pharmacy promotes increased patient safety by minimizing the risk of adverse reactions occurrence and by maximizing the therapeutic effect of medicines. In an economic perspective, clinical pharmacy lowers healthcare costs. Taking the patient's perspective, pharmacists' clinical interventions increase patient's knowledge about their medicines, thereby increasing the likelihood of adhering to therapy. (1)(6)

Universities have a key role to play in ensuring that what is taught meets the needs of the profession and also meets societal needs in terms of workforce demand. This implies that academia needs to be constantly updated on the trends of the profession and on future potential roles for pharmacists. Assuming this as granted, the educational focus should no longer be merely targeted at the technical knowledge around medicines compounding and dispensing, but also comprise a more clinical component, which may include problem based learning, targeted at professional practice, patient contact and medicines use management. (1)(2)

"Clinical pharmacy competence is achieved when one possesses the knowledge, skills and attitudes required to provide direct patient care to ensure rational medication use" (7). In

accordance, it is very important that universities have curricular units that promote the development of competencies in professional, scientific and personal fields, shown in table 1.

Table 1 Core Competency framework for Clinical Pharmacists (1)(7)(8)(9)

Scientific skills	Strong understanding of diseases and medicines mechanism of action
	Solid knowledge of medical terminology
	Strong understanding of possible pharmacology interactions and adverse drug reactions
Personal skills	Communication with the patients, medical staff and community in general
	Decision making
	Critical thinking
	Problem-solving
	Team working
Professional skills	Respond appropriately to medical emergencies, including provision of first aid.
	Therapeutic planning skills
	Assess and interpret physical and laboratory findings
	Patient consultation and counselling
	Pharmacokinetic monitoring
	Adverse drug reactions monitoring
	Reviews and manages patient medicines
	Identifies and manages medication safety
	Provision of medicines information and education

However, it is not only necessary to provide tools for these skills to be acquired. It is also needed to ensure an accurate evaluation and measurement of whether students can actually put these skills into practice. Miller proposed a clinical knowledge assessment model.

Miller divides the clinical knowledge assessment in four different sections/levels:

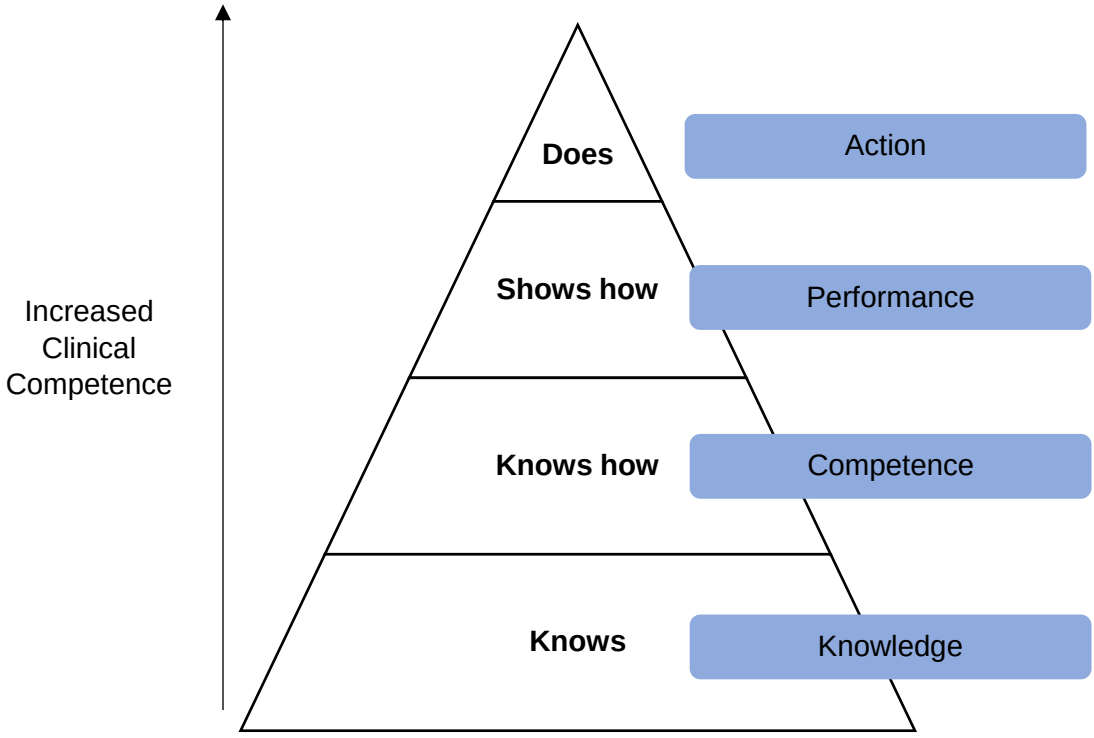
1. **Knowledge**
   The student knows what is required to carry out the professional activities effectively.
2. **Competence**
   The student knows how to functionally develop a particular duty, having sufficient knowledge, judgment and skill for that.
3. **Performance**
   The student shows how to develop a particular activity in artificial examination settings.
4. **Action**
   The student does what was learned when functioning independently in clinical practice.

These four levels will lead us to Miller's Pyramid of assessing clinical competence. At the bottom of the Pyramid, we can find "Knowledge" which can be tested by written tests. The second level of Miller's pyramid comprises "Competence", which implies testing the application of knowledge by clinical problem solving. The third level, concerning "Performance" is tested by clinical skills practical demonstration. The top of Miller's pyramid, corresponds to the application in practice of knowledge, which implies putting in "Action" during daily patient care

the right procedures applied correctly and at the right time; this may be assessed by direct observation in clinical settings. Miller's framework is an easy and applicable way for us to evaluate clinical pharmacy education. Only by investing in a strong practical teaching component, pharmacists will be capable of achieving advanced level clinical knowledge, demonstrated by action in the clinical setting. Universities should ensure that all their students reach all levels of Miller's Pyramid. Faculties with poor clinical pharmacy education probably stay in the lowest level of the pyramid. On the other hand, countries that have a developed clinical pharmacy and education may be allocated to the second or third levels, depending on how much realistic is the practical teaching (10)

Figure 1 [Adapted] Miller's pyramid of assessing clinical competence

(10)



In 1997, WHO introduced the seven-star pharmacist concept, which aims to point the seven roles that a good pharmacist should assume throughout his working life. One of these stars is the pharmacist as a life-longer learner. Since then, the responsibility of continuing education is growing as the opportunities and challenges for pharmacists are rising. The constant search for continuous knowledge acquisition should be initiated at the beginning of MSc in Pharmaceutical Sciences, consolidated throughout the degree, and further developed, strengthened or specialised throughout life to meet current and future requirements of practice. It is strictly essential to have not only a graduate education with a solid clinical component, but also to ensure that upon completion of the MSc, pharmacists have options to increase their knowledge and develop their clinical skills. (1)(7)(11)(12)

Post-graduate education takes a fundamental position in the life of a clinical pharmacist. Thus, Masters and PhD programmes should exist in a number and quality appropriate for the demands of current professional activities. Beyond post-graduate clinical

education leading to a degree, pharmacist should have access to Continuous Professional Development CPD programmes and other additional certificates. (1) The International Pharmaceutical Federation (FIP) defined CPD as “the responsibility of individual pharmacists for systematic maintenance, development and broadening of knowledge, skills and attitudes, to ensure continuing competence as a professional throughout their careers” (13). The pharmacists should as a life-long learner:

1. recognize his knowledge gaps;

2. make a plan of what to learn and how to acquire that knowledge;

3. learn, integrate and apply in their everyday duties. (1)

The United States (US) are described as one of the most developed countries in terms of Clinical Pharmacy practice and education. In the US, Clinical Pharmacy is a well-known area of specialisation, being a separate profession. American Clinical pharmacists are educated and trained in many healthcare environments, being integrated in multidisciplinary teams of health professionals. This specialized knowledge and clinical experience is gained though residency training and specialist board certification. The Board of Pharmacy Specialities (BPS) recognises the following 12 speciality practice areas: Ambulatory care Pharmacy, Cardiology Pharmacy, Compounded Sterile Preparations Pharmacy, Critical Care Pharmacy, Infectious Diseases Pharmacy, Geriatric Pharmacy, Nuclear Pharmacy, Nutrition Support Pharmacy, Oncology Pharmacy, Paediatric Pharmacy, Pharmacotherapy and Psychiatric Pharmacy. US Pharmacists practice in several health care environments, mainly, emergency settings, hospitals, community pharmacies, nursing homes and managed care organizations. (15)

The European reality is much more different with a lot of differences in terms of clinical pharmacy education and practice among the European countries. (14)

2. Aims of the research

2.1. General aims

a. To characterize the education and practice of clinical pharmacy in European countries;
b. To provide recommendations for improved clinical pharmacy education in Europe.

2.2. Specific aims

a. To identify the main gaps in clinical pharmacy education in Europe;
b. To characterise and map out the undergraduate clinical pharmacy education in Europe, according to the number of hours spent on this topic and number of ECTS attributed;
c. To further detail undergraduate clinical pharmacy education in terms of the distribution of practical teaching in the overall context of the curricular unit;
d. To characterise European post-graduate educational offer in clinical pharmacy;
e. To identify poles of good clinical pharmacy education in Europe to be used as a road map for dissemination among early career practitioners and recent graduates;
f. To describe functional areas, specialities, competences or regulations where clinical pharmacy is valued.

3. Materials and methods

3.1. Study design

A cross-sectional study was conducted where information collected pertains to the year of 2018.

3.1.1. Study Population and Sample

The study population considered for the sample size estimation were the 54 European countries listed by the United Nations in 2017. However, to determine the participation rate, only countries that have Pharmacy education were included. In order to have an accurate number of the target population the EAFP website (https://eafponline.eu/regions-2/) was verified and enriched with the FIP World List of Pharmacy Faculties.

Sample size considerations

The theoretical population of interest are the countries within Europe (N=54[1]). From these, those not having faculties of pharmacy will be excluded (n=50). Therefore, the universe to be considered is 50 countries.

Assuming that roughly, 90% of countries reached should have teaching in clinical pharmacy (phenomenon of interest), considering a 95% confidence interval and an effect size of 1, the sample was estimated at 44 countries to be reached.

3.2. Data collection

Data was collected using a survey, specifically developed for this purpose. The survey was originally developed in Microsoft Office Word and then transferred into a web-based platform (jotform®) to ease long-distance data collection.

The sample was determined using Epi Info (Version 7). Microsoft Office Excel was used for data analysis.

3.2.1. Survey development

The survey was developed from scratch using an expert panel composed of individuals representing the European Society of Clinical Pharmacy Education and General Committees: Bart van den Bemt, Brian Addison, Filipa Alves da Costa, Frank Jørgensen, Hege Blix, Stephane Steurbaut, Sule Rabus and Vera van Gunten.

The development was initiated by the two team members- Filipa Alves da Costa and Stephane Steurbaut- in July, refined with the entire team during August, further enriched with

[1] Although we have considered countries as the unit of analysis, in the case of United Kingdom because it is worldwide recognised as one of the leads in Clinical Pharmacy, we will consider regions, subdividing UK into Great Britain and Northern Ireland. Additionally, Great Britain will be analysed as two separate regions, England & Wales and Scotland.

a glossary -Brian Addison- and then approved by the General Committee in the end of September 2018.

3.2.2. Survey Content

The final survey included an initial section introducing the ESCP definition of Clinical Pharmacy. It then comprised three different sections, succinctly described below and available as an appendix.

Section 1: This section is intended to collect information about **Under-graduate education**. Includes questions about the education of clinical pharmacy, quantifying the number of semesters, the number of contact hours and ECTS attributed; in addition, in an effort to qualify the teaching methods, the percentage of practical training was also collected.

Section 2: This section is intended to collect information about **Post-graduate education**. This section is then subdivided into questions about the Master's degree, PhD's and post-graduate courses not leading to certificate within the area of Clinical Pharmacy. Similarly to the previous section, the number of semesters, contact hours and ECTS attributed are quantified; eligibility criteria of candidates, tuition fees and percentage of practical training, if existing, are also collected.

Section 3: This section is intended to collect information about **Professional practise**. Participants are asked if Clinical Pharmacy is recognised as an area of specialization by a national authority, in which case the name of the specialization and the regulatory body is requested, and also a clarification on the acquired specific professional rights granted by such a specialisation. In case the respondent states there is no formal recognition of clinical pharmacy, he/she is then asked if there are any professional activities where clinical pharmacy is included.

3.2.3. Data collection

The initial invitation was sent on the 4th October to all ESCP members by the Communication committee using the members' database that had academia as one of their areas of practise. Reminders were sent weekly during the month of October (8th October and 13th October).

After this initial period, the deadline was extended first to the 15th November, then to the 20th December and finally to the 31st January of 2019. From this second period of data collection, all invitations were sent informing participants the countries represented and those missing. During this second period, personal contacts (not necessarily members of ESCP) from the Educational Committee ESCP members were also used to enhance the possibility of reaching sample representativeness.

On the 27th December, a request was made to the President of the European Association of Faculties of Pharmacy (EAFP) asking for their collaboration in reaching participants. The EAFP has then sent a request to all their associates on the 14th January 2019.

3.2.4. Data Analysis

Ideally, we intended to receive only one response per country, representing the national reality of clinical pharmacy education. However, because we reached participants using the ESCP's individual contacts, we may have multiple answers from the same country. To our knowledge, there is no central registry indicating the contact person for academic matters per country. To overcome such problem, we have accepted all answers received during the study period and then mapped them out to decide if they supplement each other or if one precedes over all others.

This process was developed manually and whenever possible contacting key stakeholders in each of the countries involved to validate the research team's interpretation of data. Validation was made by stages:

Stage 1: Mapping out of responses and interpretation by the research team;

Stage 2: Production of a preliminary report (Version 1) with unified answers per country. This report was sent to all participants asking for clarification of inconsistencies and to provide additional information on missing data (1st validation). This report was sent using three mailing lists. The mailing lists used were: 1) the researcher's list, based on respondents from round 1 who voluntarily provided their contact; 2) mailing list sent by the ESCP; and 3) mailing list sent by the EAFP. During this stage the report version 1 will also be made available through ESCP website for 15 days.

Stage 3: Production of a report (Version 2) with unified answers per country to be made available through ESCP and EAFP websites during one month, open for comments;

Stage 4: Face-to-face validation at ESCP annual congress in October 2019 (2^{nd} validation); This stage is part of the project but will not have results presented for the MSc thesis, even if conducted by the student. This phase will be mostly used to deal with major inconsistencies, namely as those existing in large countries with many faculties (*eg.* France) or in countries with various regions that may have particularities (*eg.* United Kingdom)

Stage 5: Production of the final report (Version 3).

At the time of thesis presentation, only stages 1 and 2 will be completed.

3.2.5. Timeline

Activity	*March*	*April*	*May*	*June*	*July*	*August*	*Sept*	*Oct*	*Nov*
Protocol development									
Data cleaning									
Data analysis									
Preliminary report Development									
1st Validation									
Changes made according to respondents' requests for change									
Presentation of results at ESCP annual conference									
Face-to-face validation (2nd validation)									
Final report									

3.2.6. Ethics and confidentiality

This study was submitted to the FFULisboa Ethics Committee for research with human beings in May 2019 and simultaneously to the Ethics Committee of Egas Moniz.

The study received approval from Egas Moniz on the 06.09.2019 (Proc. 788), (Appendix 4) and from FFULisboa Ethics Committee on the 13.09.2019 (Proc. 2/2019), (Appendix 5).

The answers are not anonymous but we guarantee the confidentiality of the data. The sole identifier is the originating country.

4. Results and Discussion

Figure 2 European Map with highlighted respondent countries

Figure 2 shows highlighted all 36 countries from which we received answers.

According to United Nations, there are 54[2] European Countries, although, according to the sources consulted, Andorra, Liechtenstein, Monaco and Montenegro do not have Pharmacy education. Therefore, this study includes 72% of the European countries that have education in Pharmaceutical Sciences.

[2] Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kosovo (it is not on United Nations' list but we decided to include in the study), Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, North Macedonia, Northern Ireland, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan

4.1. Preliminary overview of results (14)

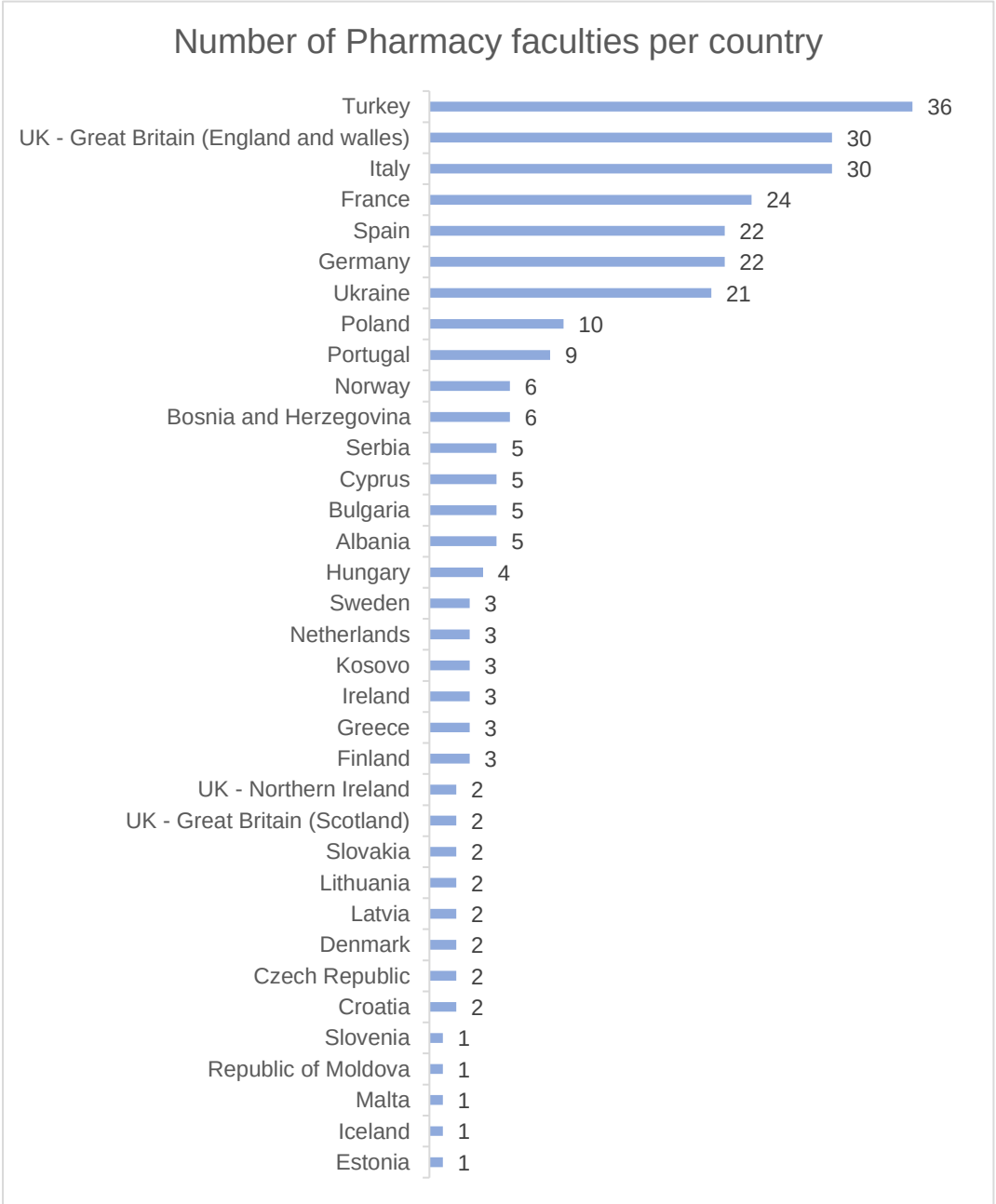
After survey's closure and data cleaning, a preliminary report (Appendix 4) was developed for further validation of all countries. We received answers from 34 countries, but considering the subdivision of the United Kingdom (UK) in regions, we are assuming a total number of 36. A comparison with preliminary data is made in section 4.2. Overview of results after first validation.

4.2. Overview of results after first validation

After publication of the Preliminary Report, we received validated documents from 18 countries: Albania, Croatia, Czech Republic, Denmark, Estonia, France, Hungary, Italy, Latvia, Lithuania, Netherlands, Norway, Portugal, Republic of Moldova, Spain, Sweden, Turkey and Ukraine. In addition, we received two more filled surveys from Bosnia and Herzegovina and Kosovo. After first validation period, we had a total number of 36 countries, but considering the subdivision of the United Kingdom (UK) in regions, we are assuming a total number of 38. The missing data and discrepancies were not included in analysis, but are quantified in every point of analysis.

Therefore, we introduced all validated data and, for the countries that did not send a validated document, we used their preliminary data.

Figure 3 Data after validation - Number of Pharmacy Faculties per country

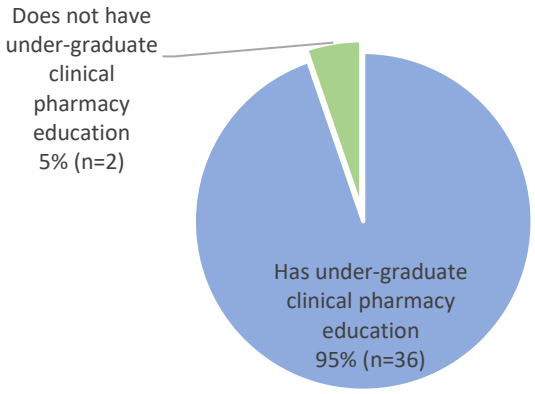


Discrepancies: 3

The number of faculties that provide an Integrated Master degree in Pharmaceutical Sciences varies widely among the European countries, with 8 faculties as the average of faculties per country (SD=9.88). Turkey have the maximum number of faculties, counting 36, and the minimum number of faculties was one.

4.2.1. Section I – Under-graduate education

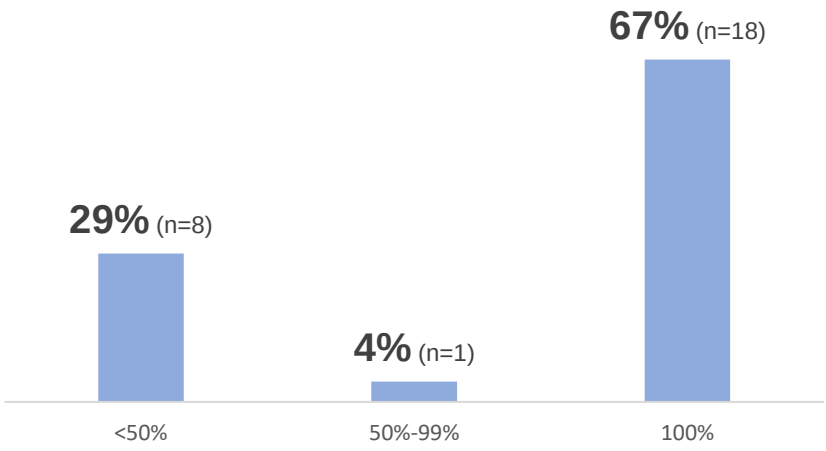
Figure 4 Existence of under-graduate education covering clinical pharmacy topics



Approximately 95% of the European countries have under-graduate education covering clinical pharmacy topics. Of note is the fact that the first validation led to the identification of a decreased value of 1% in comparison with the preliminary data.

Figure 5 Percentage of faculties that have under-graduate education covering clinical pharmacy topics by country

Missing data: 2
Discrepancies: 7



The results presented in Figure 5 show that 67% of the countries have all faculties covering clinical pharmacy topics, an increased 6% in comparison with preliminary data. In addition, 4% of the countries have between 50% and 99% coverage and 27% of the countries have less than half of the faculties covering clinical pharmacy topics.

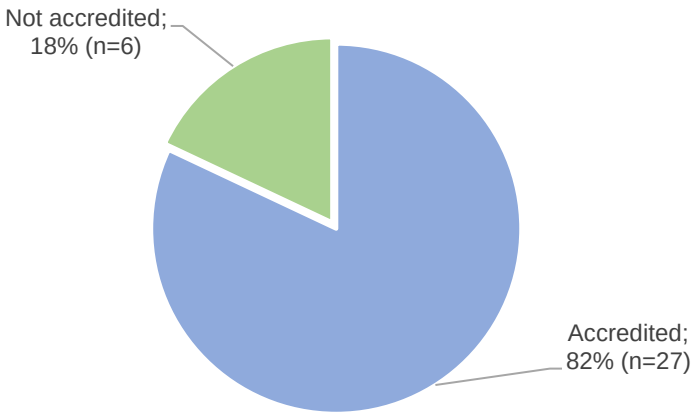
Table 2 Characterisation of the under-graduate education covering clinical pharmacy topics

	Number of semesters	Number of contact hours per semester	Number of ECTS per semester	Percentage of practical teaching
Mean	4	110	17	31
Standard deviation	2.74	122.20	14.88	16.44
Minimum	1	25	3	0
Maximum	10	406	60	60
Number of answers with missing data	3	8	3	8
Number of answers with discrepancies	8	9	9	8

The comparison between data after validation and data from the preliminary report does not show any significant differences in the values. The only two differences was an increase in 2% of practical teaching and a decreased two contact hours.

Figure 6 Accreditation of the under-graduate education

Missing data: 2
Discrepancies: 1

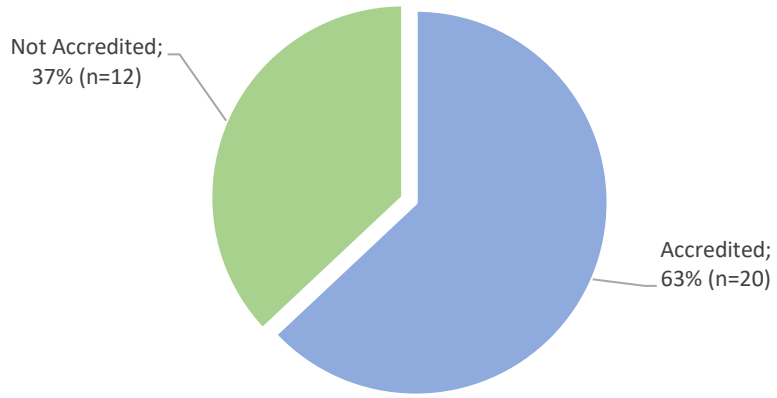


More than half (82%) of the countries assume to have accredited under-graduate education in Clinical Pharmacy, a decreased 1%, in comparison with preliminary data.

4.2.2. Section II – Post-graduate education

Figure 7 Accreditation of the post-graduate education

Missing data: 1
Discrepancies: 5

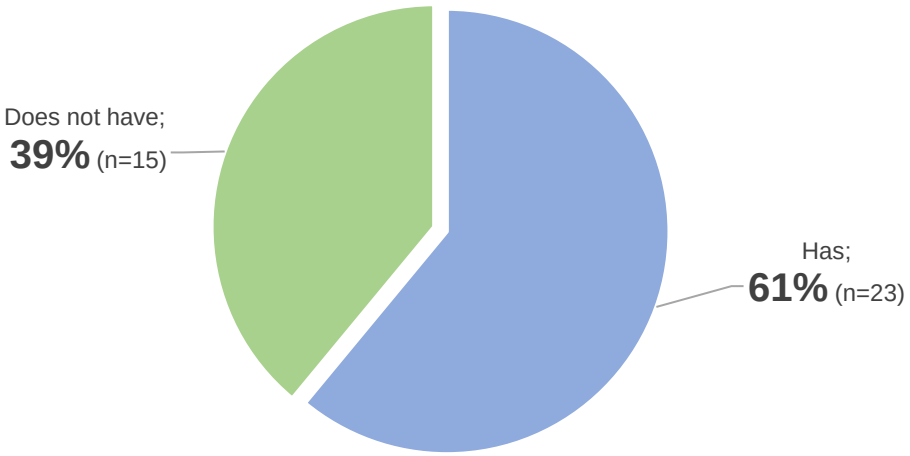


Roughly, 63% of the countries assume to have accredited post-graduate education in Clinical Pharmacy, a decreased 4%, in comparison with preliminary data.

Post-graduate education leading to an academic degree

Masters and/or Diploma degrees

Figure 8 Existence of Masters and/or Diploma degrees in Clinical Pharmacy



More than half (61%) of European countries have Master and/or Diploma degrees in Clinical pharmacy, a decreased 4% in comparison with preliminary data.

Table 3 Characterisation of the Masters/Diploma degrees in Clinical Pharmacy

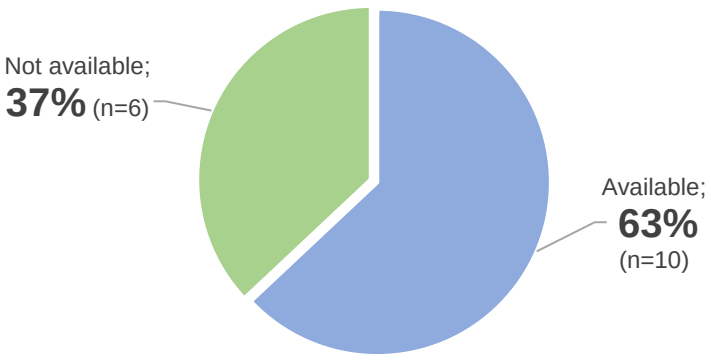
	Number of Masters/ Diploma degrees	Number of semesters	Number of contact hours per semester	Number of ECTS per semester	Percentage of practical teaching
Mean	1	4	207	36	39
Standard deviation	0.67	2.05	240.49	23.68	26.08
Minimum	1	1	0	2	0
Maximum	3	9	810	80	80
Number of answers with missing data	1	1	8	6	7
Number of answers with discrepancies	4	4	4	6	4

In general, all values in Table 3 decreased after the first validation. The validation process revealed that, each country have, on average, Master and/or Diploma degree in Clinical Pharmacy. Additionally, on average, a Master and/or Diploma degree in a European pharmacy faculty have 4 semesters, 207 contact hours per semester and 36 ECTS attributed per semester. Around 39% of the education is practical.

We received one more answer including information about Masters/Diploma degrees' tuition fees. All three answers were 1302€, 1500€ and 2600€.

Figure 9 Availability of Masters for foreigners

Missing data: 3
Discrepancies: 4

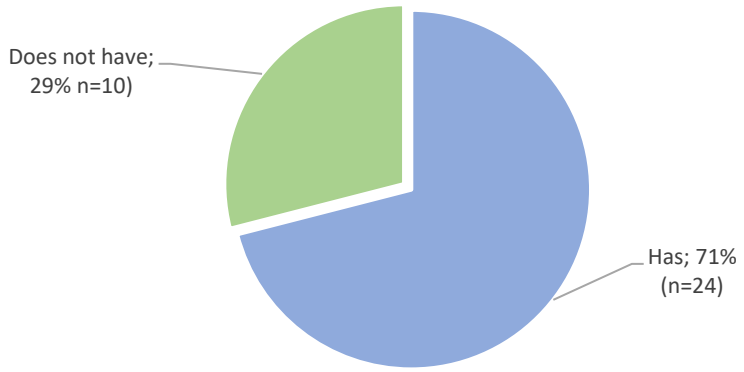


From the available Masters/Diploma degrees around Europe, 63% of them are open to foreign students, a decrease in 4% is verified, in comparison with preliminary data.

PhD Programmes

Figure 10 Existence of PhD Programmes in Clinical Pharmacy

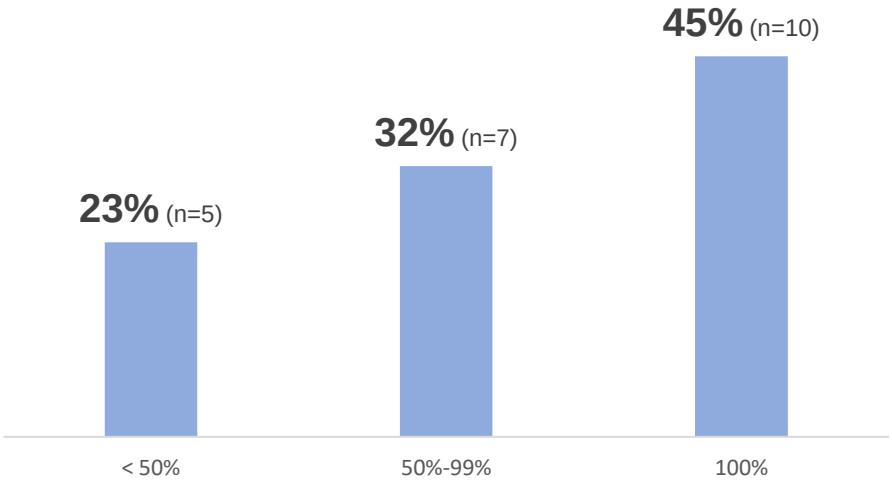
Discrepancies: 4



Approximately, 71% of European countries provide PhD programmes in Clinical Pharmacy, a decreased in 6% in comparison with preliminary data.

Figure 11 Percentage of faculties that offer PhD Programmes in Clinical Pharmacy

Discrepancies: 5

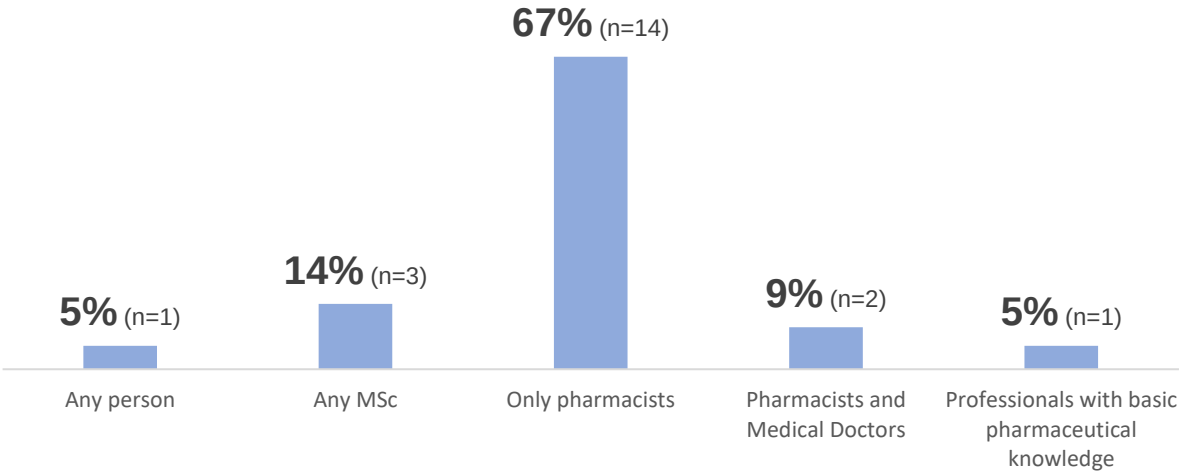


Comparing with preliminary data, this particular data has a huge difference. After the first validation, results show that in 45% of the countries, all faculties have clinical pharmacy PhD's available (increased 36%), 32% of the countries have between 50% and 99% faculties

providing Clinical Pharmacy PhD's (decreased 23%) and 23% of the countries have less than half of the faculties having clinical pharmacy PhD's (decreased 13%).

Figure 12 People that have access to PhD's in Clinical Pharmacy

Discrepancies: 6



In 67% of European countries, only pharmacists have access to Clinical Pharmacy PhD programmes decreased 7% in comparison with preliminary data. In 33% of the countries, PhD programmes in Clinical Pharmacy are not exclusively open to pharmacists, being open to other health professionals and, in some cases, open to any person.

Post-graduate education not leading to an academic degree

Table 4 Number of post-graduate programmes not leading to an academic degree

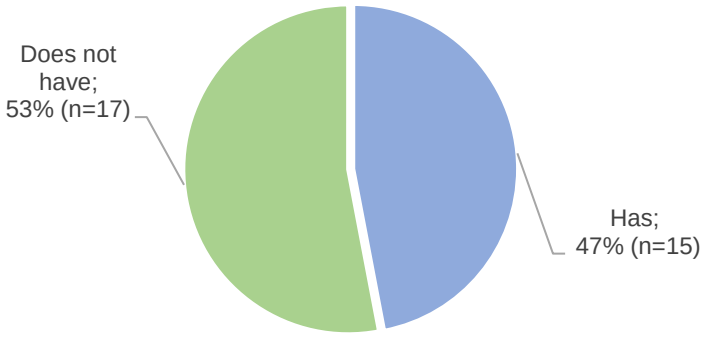
	Number of CPD Courses	Number of post-graduate programmes and/or Certifications
Mean	2	1
Standard deviation	0.91	0.74
Minimum	1	1
Maximum	3	3
Number of answers with missing data	3	2
Number of answers with discrepancies	4	4

Data shown in table 4 suggests that the post-graduate offer in clinical pharmacy, not leading to a degree, is not very developed in Europe. Overall, on average, each country only has two CPD courses and one Certification in Clinical Pharmacy. These values did not suffer any change after the first validation.

Continuous Professional Development

Figure 13 Existence of CPD courses

Missing data: 2
Discrepancies: 4

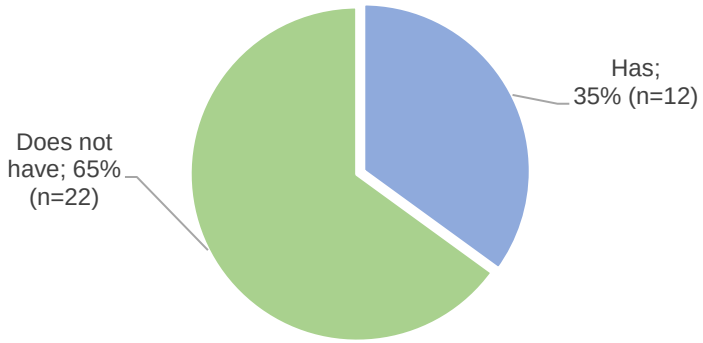


Less than half (47%) of European countries have CPD courses in Clinical Pharmacy, a increased 3% after 1st validation. Some of the CPD Courses mentioned was Pharmaceutical Care in Ashtma/COPD Management, Pharmaceutical Care in Diabetes Management and Pharmaceutical Care in Hypertension Management.

Post-graduate programmes and/or Certifications

Figure 14 Existence of post-graduate programmes and/or Certifications in Clinical pharmacy

Missing data: 2
Discrepancies: 2

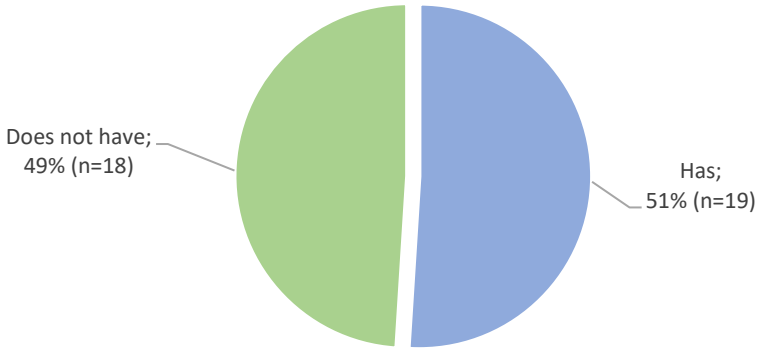


Roughly, 35% of European Countries have Post-graduate programmes and/or Certifications in Clinical Pharmacy, an increased 1% after first validation. Some of the certifications mentioned was Certification in Cardiology in Clinical Pharmacy Practice and post-graduate courses for clinical pharmacists.

4.2.3. Section III – Professional Practice

Figure 15 Existence of specialisation in clinical pharmacy

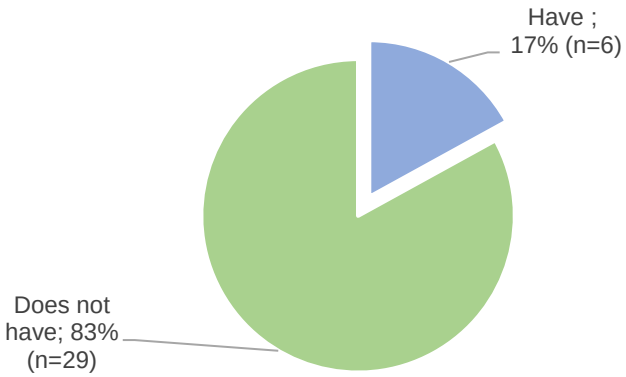
Discrepancies: 1



The percentage of countries with specialisation suffered a 1% increased comparatively with the preliminary data.

Figure 16 Existence of speciality areas in the domain of clinical pharmacy

Missing data: 1
Discrepancies: 2

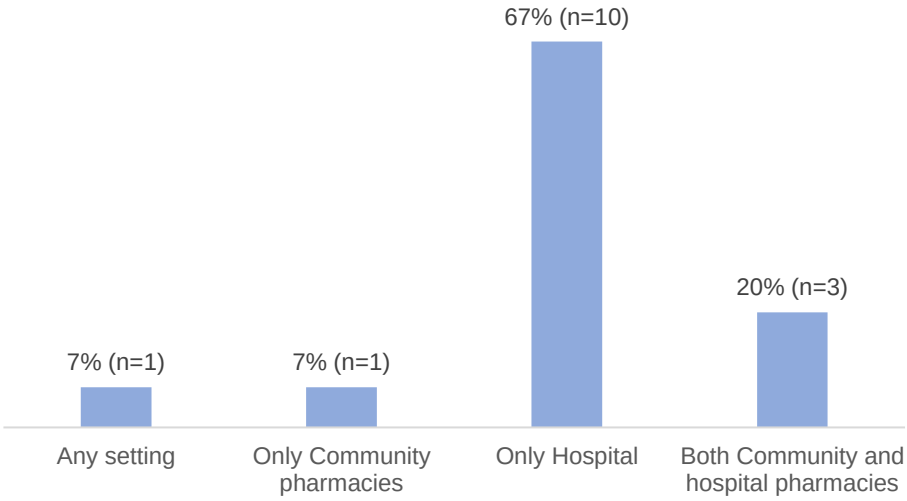


Approximately 83% of the countries do not have any speciality area in the domain of clinical pharmacy (decreased 4%). Among the 17% that assume to have speciality areas the ones mentioned, include medication management, infectiology, monitoring clinical trials and independent prescribing.

A. Countries that have Specialisation in Clinical Pharmacy

Figure 17 Application settings of the Specialisation in Clinical Pharmacy

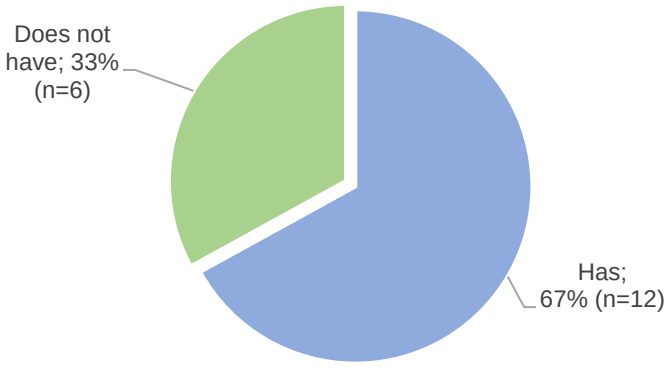
Missing data: 3
Discrepancies: 1



More than half (67%) of the Specialisation in Clinical Pharmacy attributed in Europe have application setting only at the hospital level. The aforementioned value suffered a decrease in 9% in comparison with preliminary data.

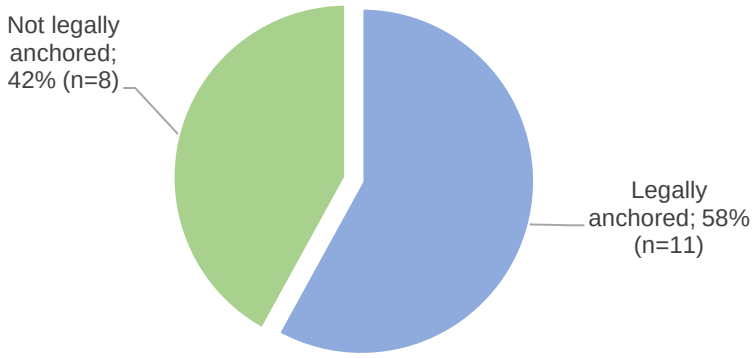
Figure 18 Existence of job specifications and/or professional rights included by the specialisation

Discrepancies: 1



Among the countries that have Specialisation in Clinical Pharmacy, 67% of them this is linked to job specifications and/or professional rights (increased 14%). Some of the job specifications mentioned are comprehensive medication review, interpretation of Therapeutic Drug Monitoring (TDM) and consultation for therapy in pregnancy and independent prescribing by pharmacists.

Figure 19 Inclusion of the specialisation in national legislation

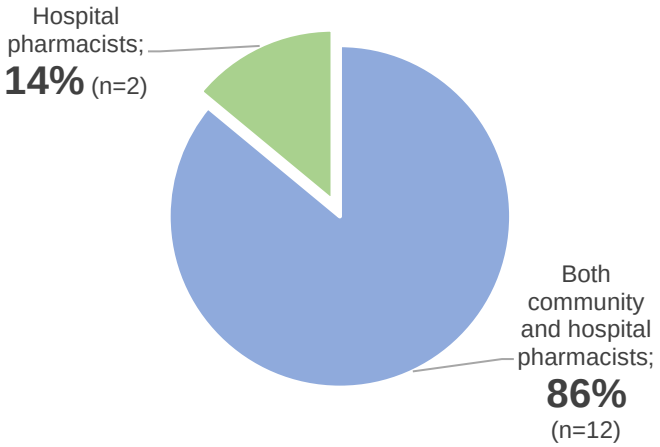


Approximately 58% of the existing specialisations in Clinical Pharmacy are legally anchored in National legislation, an increased 14% in comparison with preliminary data.

B. Countries that does not have Specialisation in Clinical Pharmacy

Figure 20 Inclusion of Clinical Pharmacy in pharmacists' activities

Missing data: 2
Discrepancies: 2



The majority (86%) of the countries that not have specialisation in clinical pharmacy, have clinical pharmacy as part of the professional activities of both community and hospital pharmacists. On the other hand, 14% of them have clinical pharmacy as part of the professional activities of only hospital pharmacists.

4.3. Case-study of Portugal

Portugal has nine faculties that provide a 5-year Integrated Master degree in Pharmaceutical Sciences, distributed all over the country.

According to one of the respondents: “The definition of Clinical Pharmacy is accepted in all faculties throughout the country. However, the rate of implementation and development varies widely, with some having a more practice oriented teaching in a real environment, whilst others are still very theory based. In terms of practice, there is also wide variation, with some hospitals being seen as centres of excellence, whilst others have difficulty to implement clinical pharmacy due to staff shortages, pharmacists’ lack of proactivity and suboptimal collaboration with other healthcare professionals”

4.3.1. Section I – Under-graduate education

All nine faculties have curricula units concerning clinical pharmacy topics.

Figure 21 Characterisation of Portuguese under-graduate education covering clinical pharmacy education

	Number of semesters	Number of contact hours per semester	Number of ECTS per semester	Percentage of Practical teaching	
Faculty 1	3	56	5	73	
Faculty 2	1	60	5	43	
Faculty 3	2	60	4	33	
Faculty 4	2	112	9	68	
Faculty 5	1	60	5	50	
Faculty 6	3	52	5	67	
Faculty 7	2	49	4	60	
Faculty 8	1	75	6	60	
Faculty 9	1	52	4	50	
	1.78 ± 0.83 {1-3}	64 ± 20 {49-112}	5.22 ± 1.56 {4-9}	56 ± 13.02 {33-73}	Mean ± SD {Minimum – Maximum}

Figure 22 Comparison between Portuguese under-graduate education in clinical pharmacy and European mean values

	Average of Portugal	Average of Europe[3]	Comparison
Number of semesters	2	4	Less 2 semesters
Number of contact hours per semester	64	110	Less 46 contact hours per semester
Number of ECTS per semester	5	17	Less 12 ECTS per semester
Percentage of practical teaching	56%	31%	More 25% of practical teaching

In terms of under-graduate education covering clinical pharmacy topics, Portugal is less developed than the European average, providing, less number of semesters, number of contact hours per semester and ECTS per semester. Additionally, in comparison with the European average, Portugal provide an under-graduate education with more 25% of practical teaching, which is apparently a good indicator.

The under-graduate education is accredited by Portuguese Ministry of Education.

4.3.2. Section II – Post-graduate education

According to the Portuguese Pharmaceutical Society[4]'s Statute, the pharmacists have the duty to "promote the permanent updating of their knowledge, in particular through the attendance of professional qualification actions (Point 5, Article 78ª of the Portuguese Pharmaceutical Society's Statute). A continuous professional development program was then introduced to ensure pharmacists preparation and permanent updating for the professional activities. Over five-year cycles, pharmacists' continuous professional development cycles require the attendance of training activities with the attribution of the corresponding Professional Development Credits. For each five-year cycle, pharmacists have to acquire 15 Continuing education credits in order to revalidate their professional card and perform pharmaceutical duties. (14)

With a Continuing Education Program settled, a great post-graduate education in clinical pharmacy would be expected, but this is not the case:

[3] These values may result from misinterpretations, which will become clearer in the validation phase.

[4] Portuguese Pharmaceutical Society – Regulator entity of the Pharmaceutical profession in Portugal

Figure 23 Summary of the Portuguese post-graduate education in Clinical Pharmacy

Leading to an academic degree		Not leading to an academic degree	
Master and/or Diploma degrees	PhD's programmes	CPD Courses	Post-graduate programmes and/or Certifications
Absence	Absence	Exist, led by two entities: - Hospital and Clinical Pharmacy Academy; - Portuguese Association of Hospital Pharmacists	Absence

CPD courses in Clinical Pharmacy are only available in hospital field. According to the responses obtained, there does not seem to be any CPD Courses dedicated to community pharmacists.

4.3.3. Section III – Professional Practice

In Portugal, Clinical Pharmacy is not recognised as an area of specialisation by the Portuguese Pharmaceutical Society, yet it is included in the professional activities of both community and hospital pharmacists.

Although Clinical Pharmacy is part of the professional activities of community and hospital pharmacists, specific clinical pharmacy post-graduate education for community pharmacists is lacking.

4.3.4. Portuguese Clinical Pharmacy Education Analysis – SWOT Analysis

Through data analysis and comparison with European data (data that may result from misinterpretations of the survey, which will become clearer in the validation phase), we were able to identify some strengths and weaknesses of clinical pharmacy education in the Portuguese faculties. As strengths we can highlight the well distributed education in Pharmaceutical sciences all over the country as well as all faculties include curricular units with clinical pharmacy topics. Additionally, it should be highlighted the 25% higher percentage of practical teaching in comparison with the European mean. Some weaknesses should mentioned such as: the number of semesters, contact hours per semester and ECTS per semester concerning clinical pharmacy are lower than European mean, the absence of post-graduate education leading to an academic degree as well as absence of instituted specialization in Clinical pharmacy. In addition, it should be highlighted, as weaknesses, the post-graduate education not leading to an academic degree being poorly developed and only targeted for hospital pharmacists.

The relocation of chronic diseases medicines' traditionally only dispensed in hospitals (*i.e:* HIV/AIDS medicines) to community pharmacies, promote the need for a more in-depth clinical intervention by the community pharmacists and the increased investment in multidisciplinary teams in primary care centres. These situations may be considered huge opportunities for the development of clinical pharmacy education. On the other hand, a possible threat is the lack of pharmacists' proactivity. Additionally, the conservative way that the medical staff and the population in general sees the pharmacist figure, may contribute for the lack of clinical pharmacy education and practice development.

Figure 24 SWOT analysis of the Portuguese Clinical Pharmacy education

Strengths	Weaknesses
➔ Education in Pharmaceutical Sciences is well distributed all over the country; ➔ Percentage of practical teaching is 25% higher than European mean.	➔ Number of semesters, contact hours per semesters and ECTS per semesters concerning clinical pharmacy are lower than European mean; ➔ Absence of post-graduate education leading to an academic degree; ➔ Post-graduate education not leading to an academic degree poorly developed and only targeted for hospital pharmacists; ➔ Absence of Specialisation in Clinical Pharmacy;
Opportunities	**Threats**
➔ Increased betting on multidisciplinary teams in primary care centres; ➔ Relocation of chronic diseases medicines' (i.e: HIV/AIDS medicines) dispensation from exclusively hospitals to community pharmacies, promoting more clinical intervention by the community pharmacists;	➔ Pharmacists' lack of proactivity; ➔ Conservative way that the medical staff and the population in general sees the pharmacist figure, may contribute for the lack of interest in the promotion of clinical pharmacy education.

Conclusions

The general aims of this research were to characterize the education and practice of clinical pharmacy in European countries as well as to provide recommendations for improved clinical pharmacy education in Europe.

Taking into consideration that the values obtained at this stage of the research may result of misunderstandings of the survey, we still can extract some valid conclusions from preliminary data analysis.

Almost all of European countries (95%) have under-graduate education covering clinical pharmacy topics. From these 95%, the majority (67%) have it in all pharmacy faculties. The SD high values and the huge difference between the minimum and maximum values showed in the characterisation of the clinical pharmacy under-graduate are the proof that clinical pharmacy education among European countries are very different in terms of investment in number of contact hours, semesters, ECTS and percentage of practical teaching. The under-graduate education in clinical pharmacy in Europe are largely accredited (82%).

Regarding post-graduate education, 61% of the European countries have available Masters and/or Diploma degrees in Clinical Pharmacy, although, only 63% of the aforementioned Masters/Diploma degrees are opened to foreigners. Around 71% of the European countries have PhD programmes available. 67% of the PhD programmes are available only for pharmacists but the other 33% might be available for other professionals such as medical doctors or other science related professionals. Concerning post-graduate education not leading to an academic degree, only 47% of the European countries have CPD Courses and when having, the European average is two CPD Courses per country. Additionally, with the lowest values, there are only 35% of the European countries having Post-graduate programmes and/or certifications in Clinical Pharmacy, which results in approximately one Certification, on average, per country.

Approximately 51% of the European countries consider Clinical Pharmacy as an area of specialisation. From the countries that have specialisation in clinical pharmacy, 67% of them include some job specifications and professional rights such as comprehensive medication review, consultation for therapy in pregnancy and independent prescribing by pharmacists. In 58% of the countries which have recognise Clinical Pharmacy as an area of specialisation, this specialisation is legally anchored in national legislation. Additionally, in 67% of the countries, the recognised specialization has its application setting only in hospital setting. On the other hand, considering the other half of the European countries that does not consider Clinical Pharmacy as an area of specialisation, 86% of countries include clinical pharmacy as part of the professional activities of both community and hospital pharmacists and the rest of the countries, included them only as part of the professional activities of hospital pharmacists.

A comparison done evaluating the number of discrepancies and answers with missing data, shows that, from the preliminary report to first validated preliminary report, reduced in 20% and 29% the number of discrepancies and missing data, respectively. These values show the importance of the data validation process. (Appendixes 6 and 7)

Portugal is an example of the main gaps among European countries, with a very low offer of post-graduate education in Clinical pharmacy. Additionally, Portugal seems to have some “basic” steps missing, mainly, the existence of a recognised specialisation in clinical pharmacy and an increased focus on clinical pharmacy topics at under-graduate level.

The vast majority of research on education in clinical pharmacy arises from the US, so we believe the development of this work is important as a first step to map out current reality and recognise opportunities for improvement. This Master thesis constitutes only a part of the

project and has inherent limitations given the timeframe for a Master thesis. Nonetheless, we believe the current work resulted in a major contribution to the development of the overall project. Some of the limitations to be recognised include the inability to finalise the validation part of the project, which led to some data at this stage still being doubtful.

In conclusion, there are some gaps in Clinical Pharmacy education and practise around Europe, with a huge variability among the different countries and among different faculties in the same country. Additionally, there is a lack of post-graduate education, mostly post-graduate education not leading to an academic degree. The data are promising but need further validation from all countries.

References

1. Wiedenmayer KRSSC a. MAGSGME. Developing pharmacy practice: A focus on patient care Handbook – 2006 edition. 2006;87. Retrieved from: http://www.fip.org/files/fip/publications/DevelopingPharmacyPractice/DevelopingPharmacyPracticeEN.pdf (accessed on 24th of May, 2019);

2. Byrd GD. Can the profession of pharmacy serve as a model for health informationist professionals? J Med Libr Assoc. 2002;90(1):68–75. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/11838462%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC64759 (accessed on 24th of May, 2019);

3. Miller R, Pharm D, Burkholder D. Historyof Clinical Pharmacy and Clinical Pharmacology. J Clin Pharmacol. 1981;21:195–7;

4. Koper D, Kamenski G, Flamm M, Böhmdorfera B, Sönnichsena A. Frequency of medication errors in primary care patients with polypharmacy. Fam Pract. 2013;30(3):313–9;

5. European Medicines Agency. 2018 Annual Report on EudraVigilance for the European Parliament, the Council and the Commission Reporting. 2019;31(March):1–36;

6. Onatade R, Appiah S, Stephens M, Garelick H. Evidence for the outcomes and impact of clinical pharmacy: context of UK hospital pharmacy practice. Eur J Hosp Pharm. 2018;25(e1):e21–8;

7. Bruce Lubotsky Levin, Ardis Hanson Peter DH. American College of Clinical Pharmacy. The definition of clinical pharmacy. Pharmacotherapy. 2008;28(6):816–7;

8. Girvin B, Wilson D. Clinical skills training for pharmacists in general practice. Prescriber. 2018;29(12):19–25;

9. Society of Ireland. Core Competency for Pharmacists. 2013;

10. Miller G. The assessment of clinical skills/competence/Performance Vol. 65, Academic medicine. 1990. p. s63–7;

11. World Health Organization. The Role of the Pharmacist in the health care. 1997;

12. Students EP, Group P, Union E, Pharmacists H. Identifying and defining competencies. 2011;

13. Naoko Arakawa SY. Japanese Pharmacists Association Lifelong Learning Support System, on-line portfolio system. Int Pharm Fed. 2014;1–46. Retrieved from: http://www.fip.org/files/fip/PharmacyEducation/CPD_CE_report/FIP_2014_Global_Report_CPD_CE_online_version.pdf (accessed on 4th of April, 2019)

14. L. Moura, S. Steurbaut, V. Jordan-von Gunten, B. Addison, S. Apikoglu-Rabus, H. Salvesen Blix, M. Kinnear, B. van den Bemt, F. Costa* on behalf of Education Committee Mapping Clinical Pharmacy Education in Europe. Oral communication at ESCP annual congress, Ljubjlana Oct 2019. Hospital Pharmacy - Clinical Education. ESCP19SY-1279 to be published in the International Journal of Clinical Pharmacy.

15. American College of Clinical Pharmacy. Retrieved from: https://www.accp.com/about/clinicalpharmacists.aspx (accessed on 2nd of September, 2019)

Appendixes

Appendix 1 *Invitation e-mail calling for participation*

Dear ESCP member, dear colleague,

We are interested to map the education and practice around Clinical Pharmacy in Europe. For that, we request your collaboration in providing us valid and reliable information about the situation and modalities in your country.

According to the United Nations, there are currently 51 countries in Europe[1]. Based on this information we have selected key informants from each of these countries to provide us with the requested information, using the European Society of Clinical Pharmacy (ESCP) members' list as well as the ESCP network. If you have received this email, this means you are the expert selected from your country. If you feel you are not the most suited to answer the questions, please direct us to the appropriate person or liaise with that person so that the survey can be performed in the most reliable way.

It is a **very short survey**, with only 12 questions, that will probably take you less than 15 minutes to respond. However, in case your country has various faculties delivering a bachelor or master degree in pharmacy/pharmaceutical sciences but with differences in the curriculum regarding clinical pharmacy, we ask you to complete the answers for each of these faculties. The answers are obviously not anonymous, but the data will be treated as confidential. The sole identifier will be the originating country. If you want or agree to be contacted after the survey, you can optionally leave your email address at the end of the survey.

Please answer now using this link Click here.

The ESCP and its Educational Committee (EdCom) acknowledge and thank you already in advance for your valued collaboration.

Kind regards,

Brian Addison, Filipa Alves da Costa, Frank Jørgensen, Hege Salvesen Blix, Moira Kinnear, Stephane Steurbaut, Sule Rabus, Vera von Gunten on behalf of the EdCom, ESCP and Bart van den Bemt on behalf of the ESCP General Committee.

Appendix 2 **ESCP Survey on Clinical Pharmacy Education in Europe**

ESCP Survey on Clinical Pharmacy Education in Europe

Mapping the education and practice around Clinical Pharmacy in Europe

1 - What is the country you are answering for?

2 - How many faculties in your country provide a degree in pharmaceutical sciences?

[Note: Bachelor Degree/Master Degree/Diploma in Pharmacy/Pharmaceutical Sciences – an undergraduate degree in the discipline of Pharmacy or Pharmaceutical Sciences]

Core definition: *Clinical pharmacy is a scientific discipline and a branch of pharmacy practice, which aims to optimise the therapeutic use of medicines by patients and professionals in order to maximise the likelihood that an optimal balance of clinical, humanistic and economic outcomes is achieved.*

Extension: As an academic discipline, Clinical Pharmacy aims to generate and disseminate knowledge that directly informs clinical decision-making, health care organisation or policy in relation to the therapeutic use of medicines. As a professional practice, Clinical Pharmacy comprises services delivered by registered pharmacists or pharmaceutical staff acting under their responsibility, which target the therapeutic use of medicines at population and/or individual patient levels. Clinical Pharmacy services can be delivered in any setting. Where **Clinical Pharmacy (CP)** services target the therapeutic use of medicines in individual patients, Clinical Pharmacy practice and **Pharmaceutical Care (PC)** delivery (defined by the Pharmaceutical Care Network Europe as "The pharmacist's contribution to the care of individuals in order to optimise medicines use and improve health outcomes") **are synonymous**. ESCP definition of Clinical Pharmacy

When answering this survey, please consider both CP and PC to report your country's situation.

3 - What do you think about the definition proposed by the ESCP?

- ☐ I agree with the definition of clinical pharmacy as proposed by the ESCP.
- ☐ I don't agree with the definition of clinical pharmacy as proposed by the ESCP.

3.a) The definition of clinical pharmacy I use is:

3.b) Could you please characterize your country in general terms in relation to the development of clinical pharmacy, both in terms of education and of practice? (please write freely)

Section I

Pre-graduate education

4 - Does the degree in Pharmacy/Pharmaceutical Sciences in any of these faculties cover (topics of) Clinical Pharmacy (considering the above mentioned definition; which implies Pharmaceutical Care may also be considered)?

- ☐ Yes. If you have answered yes, please fill in the table shown in the next question.
- ☐ No.
- ☐ I don't know. (If you ticked this option, please liaise with colleagues from other disciplines or faculties to obtain a valid answer representing your country and go back to the question)

4.a) Please write here your comments to the former question.

4.b) If clinical pharmacy (or pharmaceutical care) is taught in any of the existing faculties in your country, fill in the table below, providing detailed information for each faculty. In case your country has more than 10 faculties, please select the most relevant ones to provide this information. You do not need to name the faculties. Please do not consider hours devoted to other related topics (e.g. pharmacotherapy, pharmacology)

Faculties	Number of semesters	Number of contact hours per semester	Number of ECTS per semesters	% practical teaching
Faculty 1				
Faculty 2				
Faculty 3				
(…)				

4.c) Is the undergraduate education accredited by the regulator?

☐ Yes.

☐ No.

Section II

Post-graduate education

5 - Does your country in any of the existing faculties offer a Postgraduate Master and/or Diploma degree in Clinical Pharmacy (or pharmaceutical care)?

☐ Yes. If you have answered yes, please fill in the table shown in the next question.

☐ No.

☐ I don't know. If you ticked this option, please liaise with colleagues from other disciplines or faculties to obtain a valid answer representing your country and go back to the question.

5.a) Please write here your comments to the former question

5.b) If any of the faculties in your country offers a Postgraduate Master and/or Diploma degree in Clinical Pharmacy (or pharmaceutical care), fill in the table below, providing detailed information for each faculty. In case your country has more than 10 faculties, please select the most relevant ones to provide this information. Please do not include other related topics (e.g. pharmacotherapy or pharmacology)

Faculties	Number of semesters	Number of contact hours per semester	Number of ECTS per semesters	% practical teaching	Open to foreigners?	Tuition fees
Faculty 1						
Faculty 2						
Faculty 3						
(…)						

5.c) Please provide links to the Post-graduate courses listed above when they are open for colleagues from other countries:

6. Does your country in any of these faculties offer a PhD in Pharmacy/Pharmaceutical Sciences that can be accomplished in the domain of Clinical Pharmacy?

☐ Yes.

☐ No.

6.a) If you have answered yes, please state in how many of the faculties this PhD is available:

6.b) If you have answered yes, please state which professionals have access to this PhD?

7. Does you country offer any other type of continuous professional development (CPD) course(s) in Clinical Pharmacy?

☐ Yes.

☐ No.

7.a) If you have answered yes, please provide more details on these CPD courses available

Courses	Name of the course programme	How many hours does this specific course includes?	Does it include practical teaching (yes/no)?	Additional detais
Course 1				
Course 2				
Course 3				
(…)				

8. Does you country offer any other type of continuous post-graduate programme(s) or certifications in Clinical Pharmacy?

☐ Yes.

☐ No.

8.a) If you have answered yes, please provide more details on the available certifications

Courses	Name of the certification	How many hours does this certification includes?	Does it include practical teaching (yes/no)?	Additional detais
Certification 1				
Certification 2				
Certification 3				
(…)				

8.b) Is the postgraduate education accredited by the regulator?

☐ Yes.

☐ No.

Section III

Professional practise

9. Does you national authority (e.g government) and/or professional body (e.g Pharmaceutical Society) officially recognize Clinical Pharmacy as an area of specialization?

☐ Yes.

☐ No.

9.a) If you have answered yes, please state which is (are) the body (bodies) that recognise this specialization.

9.b) If you have answered that Clinical Pharmacy is an officially recognised specialization, please provide the name of this specialization and its application setting (e.g. hospital pharmacy).

9.c.) If you have answered that Clinical Pharmacy is officially recognized as a distinct specialization, does such recognition include any specific professional rights or job specifications?

- ☐ Yes.
- ☐ No.

9.c.1) If you answered yes, please name the specific professional rights or job specifications that apply.

9.d. If Clinical Pharmacy is officially recognized as a distinct specialization, is this legally anchored, i.e. taken up in national legislation?

- ☐ Yes.
- ☐ No.

9.d.1) If you have answered yes, please provide the legal reference, even when not in English.

9.e) In case you have stated Clinical Pharmacy is NOT officially recognised as a distinct specialization, please let us know if it is part of any of the following

- ☐ The professional activities of community pharmacists.
- ☐ The professional activities of hospital pharmacists.
- ☐ The professional activities of both community AND hospital pharmacists.
- ☐ None of the above.
- ☐ I don't know.

9.e.1) Please write here your comments to the previous question

10. Are there any specific areas officially recognized as speciality areas by the national authority and/or professional body in the domain of clinical pharmacy?

- ☐ Yes.
- ☐ No.

10.a) If you answered yes, please state which.

11. In some countries, pharmacy competency frameworks have been emerging (A complete collection of competencies that are thought to be essential to performance; FIPEd; 2012 available at https://www.fip.org/files/fip/PharmacyEducation/GbCF_v1.pdf). Do you have such frameworks in your country?

- ☐ Yes.
- ☐ No.

11.a) If you have answered yes, is clinical pharmacy (or pharmaceutical care, as named by the FIP global competency framework) part of any of these frameworks?

- ☐ Yes.
- ☐ No.

12 - If you would like to be contacted regarding the results of this survey and/or if we may contact you in case we would have additional questions (e.g. clarification of an answer provided), please leave your email address

Submit

Appendix 3 *Preliminary Report (First page and Belgian Report)*

Mapping Clinical Pharmacy Education In Europe

Preliminary Report **for validation**

L. Moura[1], S. Steurbaut[2*#], V. Jordan-von Gunten[3*], B. Addison[4*], S. Apikoglu-Rabus[5*], H. Salvesen Blix[6*#], M. Kinnear[7*], B.van den Bemt[8#], F. Costa[9*]

[1]Faculty of Pharmacy, University of Lisbon, Lisboa, Portugal, [2]Department of Clinical Pharmacology & Clinical Pharmacy (KFAR), Vrije Universiteit Brussel, Faculty of Medicine and Pharmacy, Brussels, Belgium, [3]Hôpital du Valais, Sion, Switzerland, [4]School of Pharmacy & Life Sciences, Robert Gordon University, Aberdeen, United Kingdom, [5]Marmara University, Istambul, Turkey, [6]Norwegian Institute of Public Health, Oslo, Norway, [7]University of Strathcycle, Strathcycle, United Kingdom, [8]Medical Center Nijmegen, Radboud University, Nijmegen, Netherlands, [9]Social Pharmacy, Faculty of Pharmacy, University of Lisbon, Lisboa, Portugal

*On behalf of Education Committee; #On behalf of the General Committee.

Data collection of each European country's clinical pharmacy education and practice was undertaken between November 2018 and April 2019. Data were processed and analysed, leading to this Preliminary Report, which primarily intends to consolidate and validate the information provided about each country.

How can you validate the information of your country?

1. **All the answers must be validated**. This validation can be done by filling the validation framework that follows shortly after each question and/or statement;
2. There is some missing information, identified in yellow, preceeded by the warning "Missing data";
3. In some cases, we received various responses from the same country. Whenever these match, no note is taken, and the answer is considered valid if provided by more than one respondent. In case non-matching answers were obtained, we provide you the different options highlighted in yellow and ask your cooperation in telling us which one is the correct answer and if possible provide us also with external links or references to support the claim. There is also the possibility that you consider none is true, in which case we also ask you to act similarly, state it and support your statement;
4. At the end of this document, the countries for which no response was obtained are listed. We would be extremely grateful if you could help us identify at least one person from these countries that could identify the best person to answer the questions posed. In that case, we ask you to please provide us with the contact details of that person;
5. The deadline for validation is **September 6th** since the results will be presented for further face-to-face verification during the ESCP Symposium to be held in Ljubljana in October 2019.
6. The validated document must be sent by e-mail for Laura Moura (lauramoura@campus.ul.pt).

Notes:

- **The easier way of validation is using the "Fill and Sign" tool of Adobe Reader followed by "Add text";**
- If you have any questions, please contact Filipa Alves da Costa (alvesdacosta.f@gmail.com)

Belgium

General overview of Belgium

Number of inhabitants [1]	11 000 638
Number of practicing pharmacists / 100 000 population [2]	118.8
Number of hospitals / 100 000 population [3]	1.7
Number of community pharmacies / 100 000 population [4]	43.9

Table 2 General overview of Belgium

Introductory Note

We received two answers from Belgium. In case of discrepancies, both two answers are discriminated for proper validation.

1. Characterization of the Belgian Clinical Pharmacy Education

Answer 1: Belgium has 9 faculties that provide an Integrated Master degree in Pharmaceutical Sciences.

Answer 2: Belgium has 8 faculties that provide an Integrated Master degree in Pharmaceutical Sciences.

Which of the answers is correct?	Additional information/Correct answer:
☐ Answer 1	
☐ Answer 2	
☐ None of the answers	

Answer 2:" In Belgium, clinical pharmacy is beyond the starting point, but is not already fully established (both education and practice)."

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

2. Under-graduate education

The under-graduate education in Belgium is accredited by a regulator.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

Answer 1: Two faculties that provide an Integrated Master degree in Pharmaceutical Sciences covers topics of Clinical Pharmacy. (table 2)

	# semesters	# contact hours/semester	# ECTS/ semester	% Practical teaching	
Faculty 1	1	40	3	50	
Faculty 2	1	40	4	20	
	1 ± 0 {1-1}	40 ± 0 {40-40}	3.5 ± 0.71 {3-4}	35 ± 21.21 {20-50}	Mean ± Standart deviation {Minimum – Maximum}

Table 3 Clinical pharmacy component in the under-graduate education (Answer 1)

Answer 2: Only one faculty that provide an Integrated Master degree in Pharmaceutical Sciences covers topics of Clinical Pharmacy.

	# semesters	# contact hours/semester	# ECTS/ semester	% Practical teaching
Faculty 1	2	40	5	60

Table 4 Clinical pharmacy component in the under-graduate education (Answer 2)

Which of the answers is correct?	Additional information/Correct answer
☐ Answer 1	
☐ Answer 2	
☐ Both answers	
☐ None of the answers	

3. Post-graduate education

Answer 1: The post-graduate education in Belgium is not accredited by a regulator.

Answer 2: The post-graduate education in Belgium is accredited by a regulator.

Which of the answers is correct?	Additional information:
☐ Answer 1	
☐ Answer 2	

3.1. Post-graduate education leading to an academic degree

3.1.1. Master/Diploma degree

There is no available Master or Diploma degree in Clinical Pharmacy.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

"In Belgium (Flanders) clinical pharmacy is a course in the education to obtain the diploma of hospital pharmacist; one university offers a post-grad certificate in clinical pharmacy."

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

3.1.2. PhD programmes

8 out of 9 faculties in Belgium have available PhD programmes about Clinical Pharmacy.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

Answer 1: PhD programmes are availlable for Pharmacists, masters in sciences, masters in biomedical sciences, bio-engineers, physicians, dentists and veterinarians.

Answer 2: PhD programmes are available only for pharmacists.

Which of the answers is correct?	Additional information/Correct answer
☐ Answer 1	
☐ Answer 2	
☐ Both answers	
☐ None of the answers	

3.2. Post-graduate education not leading to an academic degree

3.2.1. Continuous professional development courses (CPD Courses)

Belgium does not have any CPD Courses in Clinical Pharmacy.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

3.2.2. Post-graduate programmes/Certifications

Answer 1: Belgium has one CPD Course in Clinical Pharmacy.

	Name of the Certification	# Hours	Practical teaching	Additional details
Certification 1	Certificat universitaire en pharmacie clinique	130	yes	

Table 5 Clinical Pharmacy CPD Courses (Answer 1)

Answer 2: Belgium does not have any post-graduate programmes or certifications in Clinical Pharmacy.

Which of the answers is correct?	Additional information/Correct answer
☐ Answer 1	
☐ Answer 2	
☐ Both answers	
☐ None of the answers	

4. Professional Practice

In Belgium, Clinical pharmacy is not considered an area of specialisation.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

Clinical pharmacy is part of the professional activities of both community and hospital pharmacists.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

There is no recognised speciality areas in the domain of clinical pharmacy.

Is this information correct?	Additional information/Explanation:
☐ Yes	
☐ No	
☐ Partially	

Do you want to provide any relevant additional informations to characterise Belgium in terms of education and practice of clinical pharmacy? If yes, please write freely below:

References

[1] United Nations Statistics Division. *Population and Vital Statistics Report* (Table 2: Population, latest available census and estimates, latest available data). Retrived from https://unstats.un.org/unsd/demographic-social/products/vitstats/index.cshtml (accessed on July 16th, 2019);

[2] World Health Organization - Regional Office for Europe. European Health Information Gateway. Retrived from https://gateway.euro.who.int/en/indicators/hlthres_191-practising-pharmacists-per-100-000/ (accessed on June 29th, 2019);

[3] World Health Organization - Regional Office for Europe. European Health Information Gateway. Retrived from https://gateway.euro.who.int/en/indicators/hfa_470-5010-hospitals-per-100-000/visualizations/#id=19523&tab=table (accessed on June 29th, 2019);

[4] OECD (2017), Health at a Glance 2017: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/health_glance-2017-en.

Appendix 4 *Egas Moniz Ethics Approval*

Comissão de Ética EGAS MONIZ

Proc. Interno nº 788

Adenda

Ex.ma Senhora

Profª. Doutora Filipa Alves da Costa

Monte de Caparica, 24 de julho de 2019.

Ex.ma Senhora,

Em resposta ao Pedido de Parecer que submeteu à apreciação da Comissão de Ética da Egas Moniz, com o tema denominado **"Mapping Clinical Pharmacy Education in Europe"**, foi aprovado.

Com os melhores cumprimentos,

A Presidente da Comissão de Ética da Egas Moniz

Profª. Doutora Maria Fernanda de Mesquita

EGAS MONIZ – COOPERATIVA DE ENSINO SUPERIOR, CRL
Campus Universitário – Quinta da Granja – Monte de Caparica
2829-511 Caparica

Appendix 5 CEISH Ethics Approval

CEISH Comissão de Ética para a Investigação em Seres Humanos

Parecer nº 02/2019

Foi submetido à Comissão de Ética para a Investigação em Seres Humanos da Faculdade de Farmácia da Universidade de Lisboa (CEISH) o pedido de parecer identificado com o nº 02/2019, para que a mesma se pronunciasse sobre as questões de ética suscitadas no protocolo de investigação que envolve seres humanos e será levado a cabo na FFULisboa e/ou a instituição está envolvida enquanto parte interessada.

O protocolo de investigação insere-se no âmbito do projeto **"Mapping out Clinical Pharmacy Education in Europe"** sendo os investigadores responsáveis Filipa da Palma Carlos Alves da Costa (investigador principal, e Professora Auxiliar Convidada na FFULisboa), Laura Alexandra Moura Gomes da FFULisboa e Stephane Steurbaut (Universitais ziekenhuis Brussel).

O protocolo de experimentação em questão é um estudo transversal, com o envolvimento da FFULisboa. Os investigadores comprometeram-se a assegurar que durante o estudo serão respeitadas todas as disposições legais em vigor e as recomendações constantes da Declaração de Helsínquia, da OMS e demais disposições no que se refere à investigação que envolva seres humanos.

O protocolo de experimentação em questão é um estudo transversal, com o envolvimento da FFULisboa. Os investigadores comprometeram-se a assegurar que durante o estudo serão respeitadas todas as disposições legais em vigor e as recomendações constantes da Declaração de Helsínquia, da OMS e demais disposições no que se refere à investigação que envolva seres humanos.

De acordo com os parâmetros avaliados por esta Comissão, e em conformidade com a legislação em vigor, a CEISH concede **parecer favorável** relativamente à realização do presente protocolo de investigação, e recomenda ao Diretor da FFULisboa a sua apreciação final positiva e respetiva homologação.

Lisboa, 13 de Setembro de 2019

Homologo. 16/9/2019

O Presidente da CEISH.

Professor Doutor Bruno Miguel Nogueira Sepodes

Av. Prof. Gama Pinto, 1649-003 Lisboa |
t. +351 217 946 400| f. +351 217 946 470 | ceish@ff.ulisboa.pt

Appendix 6 *Comparison between preliminary report and validated report in terms of number of answers with discrepancies*

	Number of answers with discrepancies	
	Preliminary Report	Validated report
Number of pharmacy faculties	5	3
Section I – Under-graduate education	47	42
Section II – Post-graduate education	71	58
Section III – Professional Practice	12	5
Total	135	108

Appendix 7 *Comparison between preliminary report and validated report in terms of number of answers with missing data*

	Number of answers with missing data	
	Preliminary Report	Validated
Section I – Under-graduate education	39	26
Section II – Post-graduate education	79	59
Section III – Professional Practice	9	5
Total	127	90